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## AUTOMOBILES.

*Schule des automobil Fahrers.* By Wolfgang Vogel. Pp. viii + 189. (Berlin: Schmidt, 1902.) Price m. 2'60.

**M**R. WOLFGANG VOGEL has moved about on his motor cars with such pleasure to himself that it has resulted in a desire to share that pleasure with others, and he addresses his book chiefly to those who are unlearned, not only in motor cars, but even in the rudiments of the usage of machines. He is right in this, for they are numerous.

Probably the largest percentage of persons who are quite ignorant of mechanical matters exists among the upper classes. The millions who work in factories, delve in mines, and direct some one or other of the innumerable agricultural appliances have had an acquaintance with machinery forced upon them. Few of these would require a diagram and many words to indicate the use of a sight feed oiler or a Stauffer lubricator, by whatever name they might distinguish them.

But among those who can buy motor cars these things are still a mystery, and it is likely that the automobile movement will cause a very important alteration in the mental attitude of the so-called cultivated classes towards machines, and thence towards mathematics and science. At present, therefore, it is reasonable that a book such as Herr Vogel's should give elementary diagrams of the Otto cycle and obvious sketches of the much-sketched induction coil.

Chapter ii. shows how explosive gas is made by spray or vapour from the liquid petrol mixed with air, how it is controlled in amount, ignited electrically, and voided noiselessly after it is burnt.

A very justifiable preference is shown for the secondary over the primary battery and for the dynamo over either for the purpose of making sparks to fire the charge; but it is remarkable how much less perfect is the electrical part of automobiles than might have been expected. Instead of working fervently in this new field, the electrician has evidently settled down to making money in his other dearly earned preserves.

If we compare the amount of energy utilised in igniting the charge in an explosion engine with the bulk and weight of the usual ignition equipment we shall feel some surprise. If we further consider how easy it is to make an electrical instrument "fool proof," especially when it is devoid of moving parts, we shall be astonished at the numbers of electrical breakdowns—the loose wires, oily contacts, broken terminals, which characterise every beginner's early motor-car runs.

It has been noted in various automobile competitions that electrical troubles were prominent in cars entered by manufacturers and agents, and almost absent from cars entered and owned by private persons, the differences being ascribed to the superior electrical knowledge of most of the amateurs who had sufficient mechanical tendencies to tempt them to what then was, in its early days, an odious sport.

There still remains much to be done to diminish the

high cost, high weight, large bulk and frequent opportunities of breakdown which characterise even the most modern motor cars, but these questions of design and improvement do not exercise our author, who contents himself with instructions how to use cars as they are.

It may be mentioned that the book contains many tabulated forms, which give, in order, the necessary operations for getting the machine ready before running, for starting up, and in case of breakdown. Copies of these tables should be of great value to the beginner, and he is intended to use them until thoroughly familiar with his machine.

The "self-mover" which is more likely than any other to create a stir in the world, and which, until he is educated up to it, the pedestrian and carriage person hates, the motorist despises, and the ordinary cyclist is jealous of, is the motor bicycle. This most useful machine by no means receives its proper share of attention at the hands of our author, who ascribes to it only two pages. It will be avenged on him some day, even if it be only in the matter of the sale of his book.

In chapter iii., Herr Wolfgang Vogel divides automobiles into cycles, voiturettes and motor cars, without showing any very good reason for so doing, though he incidentally points out that the driving of a motor tricycle will probably come more easily to one who has never been accustomed to ride a bicycle. In chapter iv. he deals with brakes, and explains simply and clearly the necessity for differential gear which so often puzzles the tyro. The subsequent chapters are given over to trailers and the like. Possible breakdowns and their remedies are dealt with.

Part ii. begins by dealing with minor accessories and the repairs of pneumatic tubes. Hints are given for lengthened tours, and a table is appended which includes all the hundred and one articles which are so apt to be left behind. The reader may gather several wrinkles from this chapter; they all deserve the description of "praktisch."

Chapters iii. and iv., which are devoted to the description of tours from Berlin to the Rhine, Switzerland and Italy, made by the author, are lightly and interestingly written, and give the reader an excellent idea of the pleasures and difficulties incidental to such tours. The run over the Stilsfer Joch, the highest bit of road in Europe, seems likely to provide as much excitement as modern man could desire.

The necessity for being provided with enough money of the various countries passed through and an ample number of spare parts is pointed out, with illustrations from the author's own experience of delays at an exacting Customs Office. A knowledge of languages is, of course, desirable.

The author proffers an admirable suggestion that continental automobile clubs should compile a register of the hotels which have suitable "stabling" for motor cars, and not confine their attention to the places where petrol can be procured. He is, of course, not cognisant of the good work done by the English Automobile Club both in this and in every other direction for road and route improvement.

The author favours petrol cars, and, according to him, the purchase of a motor cycle only engenders the

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desire for a voiturette, which had better have been satisfied from the first. If he were to sit on one or two committees of the English club above named, he would learn to his astonishment that a number of members who already possess a luxurious car are adding a motor cycle to their "stable," a fact which is hardly in accord with his opinion.

From the brevity of part iii., which deals with electromotors, and of part iv., which devotes to steam cars the short space of four pages, he would appear to be less than kind to the formidable competitors of his favourite petrol explosion engine.

On the whole, the book gives in a very simple and interesting manner a large amount of information which must prove invaluable to the beginner, and may with advantage be studied even by those who are more conversant with the vagaries of the motor car.

The author's style is unusually understandable to English readers, and with a little judicious "skipping" the sense can easily be followed, owing to the number and clearness of the illustrations, without the laborious necessity of using a dictionary.

MERVYN O'GORMAN.

#### COMPARATIVE ANATOMY OF ANIMALS.

*An Introduction to the Study of the Comparative Anatomy of Animals.* Vol. ii. By G. C. Bourne, M.A., D.Sc. Pp. xv + 321. (London: G. Bell and Sons, 1902.) Price 4s. 6d.

DR. BOURNE'S work is divided into thirteen chapters, which, though serial with those of the preceding volume, are separately paged. In addition, there is a short "conclusions" chapter—in reality a concise summary of the contents of the book, with some good advice to the student—and also an excellent index.

The text treats of the coelomate Metazoa, with a special leaning to the developmental side, which the author regards as indispensable to "a just appreciation of the problems of comparative anatomy." Of the thirteen chapters, the first is restricted to the Platyhelminia, with especial reference to the liver fluke; the second and third to the earthworm alone; the fifth mainly to the mussel; the sixth to the snail; the eighth to the crayfish; the ninth to the cockroach; and the eleventh to the dogfish. The two concluding chapters are devoted respectively to the development of the frog and a very general survey of the field of mammalian morphology; while the three which remain are in turn given to the Annelida, Crustacea, and Cephalochorda in general, to Apus and Amphioxus in particular.

In the selection of material, the author has been guided by the requirements of the "preliminary and intermediate science examinations in the universities of Great Britain." By way of illustration he gives us seventy-seven text figures, many of which are new and meritorious. The researches of Benham, von Boutin, Ehlers, Fraipoint, Hatschek, Kowalevsky, Lacaze-Duthiers, Reichenbach, Vejdovsky, Wilson, and others, have been duly laid to account, with acknowledgment, such as might well have been similarly accorded to certain English workers upon whose labours the author has drawn. Of the author's

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own diagrams, those illustrating the development of the mammal may be cited as excellent; but even here clearness might well have been further ensured, had the alimentary canal been delineated in outline, as giving rise to the allantois and yolk-sac.

The book is fully up to date and well worthy its predecessor and its author's reputation, and one of its chief attractions is its literary style. Such criticism as we offer must needs be detailed. For example, in defining the urinogenital organs of the mammal, the uterus masculinus is regarded as the persistent lower end of the Müllerian duct, with an accompanying illustration which most nearly recalls the condition in the rabbit. It might have been advantageous to point out that in this animal the organ generally thus named has been proved, by von Kolliker, Pallin, and others, to be a product of fusion of the vesiculæ seminales, and no uterus masculinus at all. Similarly, a little more precision might well have been given to both description and figure of the crayfish nervous system, by directing attention to the approximation of ganglia about the sternal artery, which this genus so instructively exhibits, as a determining feature of the decapod type. With the crayfish, again, the statement that the "gastrolith" "is supposed to form a reserve of calcareous matter to supply material for the new armour formed after ecdysis" is most certainly erroneous, and mention might rather have been made of the evidence for its association with this very function. Nor is the author more fortunate in his treatment of the decapod mandible, the wholly endopoditic nature of the "palp" of which cannot be maintained in knowledge of the facts recorded by Boas. And when we come to questions of doubt, we cannot accept the declaration of the supposed composite nature of the "cerebral ganglion-pair" in Anodon, deduced, as it would seem to be, by analogy from Pelseneer's statements for Nucula.

As to terminology, while the author is at most points sound, we consider him in error in the term "demibranch" as defining the gills of sharks; *hemibranch* it should surely be, since the root noun is Greek. Again, we much prefer the term *thoracic* to dorsal, as applied to the mid-trunk vertebræ of the mammal; and while we consider the description of the mammalian coracoid inadequate, we can only refer to the statement that the corpus callosum is characteristic of the mammalian brain as misleading, since the Eutheria alone possess it as now defined, viz. as a tract of neopallial commissural fibres invading the alveus.

The foregoing amounts almost to hypercriticism, where all else is so well done; and we would rather congratulate the author on the production of a book which, while professedly written up to the requirements of an examination system, is thoroughly trustworthy and eminently readable and instructive. It fully realises our expectations, expressed on reviewing its companion volume (*NATURE*, vol. lxii. p. 364); and, as an additional recommendation, it may be said that, in order to ensure clearness and continuity, details are in places suppressed, reference being given to authoritative sources whence they may be found already described.

There is an interesting erratum of a page and a quarter which calls for special comment, viz. a corrected figure and description of the synangium of the frog,